JC03 Rec'd PCT/PTC 24 JAN 2002

FORM-PTO-1390 (Rev. 9-2001) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER: 021238-503

U.S. APPLICATION NO. (If known, see 37 C.F.R. 1.5): Not Yet Assigned 10/031875

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/US00/19929	21 July 2000	28 July 1999

TITLE OF INVENTION: SMOKING ARTICLE WRAPPER WITH IMPROVED FILLER

APPLICANT(S) FOR DO/EO/US: Jay A Fournier and John B. Paine, III

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. ☐ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. ☒ is attached hereto (required only if not communicated by the International Bureau).
   b. ☐ has been communicated by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2))
   a. ☐ is attached hereto.
   b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. ☐ are attached hereto (required only if not communicated by the International Bureau).
   b. ☐ have been communicated by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☐ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An **UNEXECUTED** oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 20 below concern document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☐ A FIRST preliminary amendment.
14. ☐ A SECOND or SUBSEQUENT preliminary amendment.
15. ☐ A substitute specification.
16. ☐ A change of power of attorney and/or address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
18. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. ☒ Other items or information:
    SUBMISSION OF FORMAL DRAWINGS

21839

531 Rec'd PCT/PT 24 JAN 2002

U.S. APPLICATION NO. (If known, see 37 C.F.R. 1.5)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
Not Yet Assigned 10/031875	PCT/US00/19929	021238-503

21. ☐ The following fees are submitted:	CALCULATIONS	PTO USE ONLY
Basic National Fee (37 CFR 1.492(a)(1)-(5)):		
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO $1,040.00 (960)		
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO $890.00 (970)		
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO $740.00 (958)		
International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) $710.00 (956)		
International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) $100.00 (962)		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 710.00	
Surcharge of **$130.00 (154)** for furnishing the oath or declaration later than 20 ☐ 30 ☐ months from the earliest claimed priority date (37 CFR 1.492(e)).	$	

Claims	Number Filed	Number Extra	Rate		
Total Claims	27 -20 =	7	X$18.00 (966)	$ 126.00	
Independent Claims	5 -3 =	2	X$84.00 (964)	$ 168.00	
Multiple dependent claim(s) (if applicable)			+$280.00 (968)	$	
			TOTAL OF ABOVE CALCULATIONS =	$ 1,004.00	
Reduction for ½ for filing by small entity, if applicable (see below).			+	$	-
			SUBTOTAL =	$ 1,004.00	
Processing fee of **$130.00 (156)** for furnishing the English translation later than 20 ☐ 30 ☐ months from the earliest claimed priority date (37 CFR 1.492(f)).			+	$	
			TOTAL NATIONAL FEE =	$ 1,004.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00 (581)** per property			+	$	
			TOTAL FEES ENCLOSED =	$ 1,004.00	
				Amount to be refunded:	$
				charged:	$

a. ☐ Small entity status is hereby claimed.

b. ☐ A check in the amount of $_____ to cover the above fees is enclosed.

c. ☒ Please charge my Deposit Account No. 02-4800 in the amount of $ 1,004.00 to cover the above fees. A duplicate copy of this sheet is enclosed.

d. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 02-4800. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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SIGNATURE

Peter K. Skiff
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31,917
REGISTRATION NUMBER

January 24, 2002
DATE

(10/01)

Patent
Attorney's Docket No. 021238-503

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	)	
	)	
Jay A FOURNIER et al.	)	Group Art Unit: Not Yet Assigned
	)	
Application No.: 10/031,875	)	Examiner: Not Yet Assigned
	)	
National Phase of PCT/US00/19929	)	
Filed on July 21, 2000	)	
	)	
For: SMOKING ARTICLE WRAPPER	)	
WITH IMPROVED FILLER	)	
	)	
	)	

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination, please amend the above-identified application as follows:

IN THE CLAIMS:

Please replace Claims 1, 21, 24, 26 and 27 as follows:

1. (Amended) A wrapper for a smoking article of an electrical smoking system wherein tobacco is contained by the wrapper, the wrapper comprising a cellulosic web material and at least one filler therein, the filler being effective to reduce the content of gaseous components in the smoke produced upon combustion/pyrolysis of the smoking article.

21. (Amended) A cigarette of an electrical smoking system comprising a tobacco rod contained by a paper wrapper and an optional filter at one end of the cigarette, the paper wrapper comprising a cellulosic web material and at least one filler therein, the filler being effective to reduce the content of gaseous components in the smoke produced by combustion/pyrolysis of the cigarette.

24. (Amended) A cigarette of an electrical smoking system comprising a tobacco web surrounding a tobacco rod, a paper wrapper surrounding the tobacco web, and an optional filter at one end of the cigarette, the paper wrapper comprising a cellulosic web material and at least one filler therein, the filler being effective to reduce the content of gaseous components in mainstream smoke produced by combustion/pyrolysis of the cigarette.

26. (Amended) A web for a cigarette of an electrical smoking system comprising a cellulosic web material and a filler consisting essentially of magnesium ammonium phosphate and/or calcium ammonium phosphate.

27. (Amended) A cigarette of an electrical smoking system comprising a tobacco web surrounding a tobacco rod, a paper wrapper surrounding the tobacco web, and an optional filter at one end of the cigarette, the tobacco web comprising tobacco and at least one filler therein, the filler being effective to reduce the content of gaseous components in mainstream smoke produced by combustion/pyrolysis of the cigarette.

REMARKS

In view of the foregoing, favorable action in connection with this application is respectfully requested.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

By: _____
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Date: May 14, 2002

Attachment to PRELIMINARY AMENDMENT

Marked-up Claims 1, 21, 24, 26 and 27

1. (Amended) A wrapper for a smoking article of an electrical smoking system wherein tobacco is contained by the wrapper, the wrapper comprising a cellulosic web material and at least one filler therein, the filler being effective to reduce the content of gaseous components in the smoke produced upon combustion/pyrolysis of the smoking article.

21. (Amended) A cigarette of an electrical smoking system comprising a tobacco rod contained by a paper wrapper and an optional filter at one end of the cigarette, the paper wrapper comprising a cellulosic web material and at least one filler therein, the filler being effective to reduce the content of gaseous components in the smoke produced by combustion/pyrolysis of the cigarette.

24. (Amended) A cigarette of an electrical smoking system comprising a tobacco web surrounding a tobacco rod, a paper wrapper surrounding the tobacco web, and an optional filter at one end of the cigarette, the paper wrapper comprising a cellulosic web material and at least one filler therein, the filler being effective to reduce the content of gaseous components in mainstream smoke produced by combustion/pyrolysis of the cigarette.

Smoking Article Wrapper With Improved Filler

FIELD OF THE INVENTION

The present invention relates to smoking article wrappers. In particular, the invention relates to ammonium-containing compounds used as novel fillers in paper wrappers for smoking articles which are effective in selectively reducing the content of gaseous components, such as low molecular weight aldehydes, from the smoke produced during the use of such smoking articles.

BACKGROUND OF THE INVENTION

Paper wrappers for smoking articles are disclosed in U.S. Patent Nos. 2,673,565; 2,801,636; 3,744,496; 3,931,824; 4,129,134; 4,225,636; 4,231,377; 4,420,002; 4,433,697; 4,450,847; 4,622,983; 4,805,644; 4,881,557; 4,911,184; 4,915,118; 4,924,888; 4,941,485; 4,941,486; 4,984,589; 4,998,542; 4,998,543; 5,060,674; 5,092,306; 5,105,837; 5,103,844; 5,121,759; 5,131,416; 5,220,930, 5,228,463; 5,450,862; and 5,540,242, the disclosures of which are hereby incorporated by reference.

Of the above patents, the '674 patent discloses adding monoammonium phosphate to cigarette paper as a burn modifier; the '543 patent discloses adding monoammonium phosphate to cigarette paper to reduce streaking of the outer paper due to condensation on the inside paper following puffs; the '837 patent discloses adding halides, sulfates and phosphates such as ammonium chloride, magnesium chloride, magnesium sulfate, mono-ammonium sulfate and disodium phosphate to cigarette paper as burn retardants; and the '242 patent discloses adding alginates including ammonium alginate to cigarette paper as a film forming additive to reduce sidestream smoke.

U.S. Patent No. 2,815,760 discloses a tobacco smoke filter having an ion exchange material which chemically reacts with and retains carbonyl compounds such as aldehydes in the filter. U.S. Patent No. 3,685,070 discloses a tobacco

smoke filter containing the lipid soluble antioxidant N,N'-diphenyl-p-phenylenediamine (DDPD) for lowering the cytotoxic substances in the tobacco smoke. U.S. Patent No. 3,716,063 discloses a tobacco smoke filter which selectively removes volatile aldehydes, the filter being a porous particulate material such as alumina impregnated with buffered poly(alkyleneimines). U.S. Patent No. 3,878,853 discloses a cigarette filter containing a cationic component and a high molecular weight polyamine component for removal of ciliatoxic compounds from tobacco smoke.

While there have been proposals in the prior art for modifications to cigarette filters to remove aldehydes from mainstream smoke, such proposals lead away from the present invention wherein the wrapper of a tobacco smoking article is effective in reducing the content of gaseous components in mainstream smoke.

SUMMARY OF THE INVENTION

The invention provides a wrapper for a smoking article wherein tobacco is contained by the wrapper, the wrapper comprising a cellulosic web material and at least one filler therein, the filler being effective to selectively reduce the content of gaseous components in smoke produced by combustion/pyrolysis of the smoking article. According to a preferred embodiment, the wrapper comprises cigarette paper with an ammonium-containing compound filler in an amount effective to reduce aldehyde content in the smoke produced upon combustion/pyrolysis of the smoking article. The ammonium-containing compound filler is preferably an inorganic ammonium metal salt of low solubility such as magnesium ammonium phosphate. When used as a filler in the fabrication of wrappers for smoking articles, an amount equal to about 10% to about 60% of the final wrapper weight should be used, preferably about 20% to about 50% by weight based on the total weight of the wrapper.

In the smoking article wrappers of this invention ammonium-containing compounds may be used as the sole filler or may be mixed with other fillers known in the art. The filler can comprise two or more different ammonium-

containing compounds. The wrapper can have a basis weight of between about 15 grams per square meter to about 75 grams per square meter, preferably a basis weight of between about 20 to about 50 grams per square meter, and a porosity of between about 2 CORESTA units to about 200 CORESTA units, preferably between about 10 CORESTA units to about 110 CORESTA units. The wrapper can include burn additives from about 2% to about 15% by weight based on the total weight of the wrapper. In addition, the wrappers of this invention may be a conventional one wrapper construction, a multiwrapped construction or a multilayer single wrap construction. Multiwrapped constructions or multilayered constructions might have different levels of ammonium-containing fillers. If desired, the wrapper is perforated and/or includes a film forming agent. In a preferred embodiment, the wrapper, comprising an ammonium-containing compound filler, is used to contain tobacco within a smoking article which upon combustion/pyrolysis leads to a reduction in the quantity of low molecular weight aldehydes in smoke.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a graph of aldehyde reduction versus ammonia in magnesium ammonium phosphate containing cigarette papers in accordance with the invention;

Fig. 2 is a perspective view of a traditional cigarette having a single wrapper in accordance with the invention; and

Fig. 3 is a perspective view of a less traditional cigarette having more than one wrapper in accordance with the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

According to the invention, a wrapper of a smoking article is provided wherein a filler of the wrapper is effective in reducing the content of gaseous components in the smoke produced by combustion/pyrolysis of the smoking article. The wrapper is preferably a paper wrapper wherein a filler in the paper wrapper is effective in reducing the content of aldehydes in mainstream tobacco smoke during combustion/pyrolysis of the smoking article.

The wrapper according to the invention can be manufactured by conventional papermaking processes wherein a filler, of low solubility, effective in reducing the content of gaseous components in smoke is added either by itself or as a mixture with other filler materials to an aqueous slurry containing cellulosic material.

According to a first aspect of the invention, fillers are proposed for wrappers of smoking articles wherein tobacco and tobacco-containing products are contained by the wrappers. As used herein the term tobacco includes not only cut tobacco leaf filler usually found in cigarettes, but also includes expanded tobacco, extruded tobacco, reconstituted tobacco, tobacco stems, tobacco substitutes, and synthetic tobacco, and blends thereof. A tobacco rod includes any substantially cylindrical, tobacco-containing smoking article, e.g., a cigarette.

In accordance with a first embodiment of the invention, the physical and chemical properties of the filler material used to produce smoking article wrappers are chosen and utilized to reduce the aldehyde content of the smoke produced during combustion/pyrolysis of the smoking article. According to a preferred embodiment, the paper filler includes an ammonium-containing compound which when heated evolves ammonia which may chemically react with aldehydes in tobacco smoke and/or modify the combustion/pyrolysis reactions thereby reducing the initial formation of aldehydes, thereby decreasing the delivery of such aldehydes to a smoker.

A preferred ammonium-containing compound is an inorganic ammonium metal salt such as an ammonium-alkaline earth metal salt such as $MgNH_4PO_4 \bullet xH_2O$ wherein x ranges from 1 to 6. It is preferred that the ammonium-containing compound have a low solubility in water so as to be compatible with conventional papermaking processes, e.g., the filler is substantially insoluble in an aqueous dispersion containing ingredients of the paper such as flax, etc. That is, the ammonium-containing compound should be stable enough in a papermaking process to survive intact as filler in the final paper

product. This includes sufficient thermal stability to survive the drying steps in the papermaking process. Magnesium ammonium phosphate and its hydrates are well-suited to conventional papermaking processes, and evolve ammonia during the smoking process in a manner that greatly decreases the content of certain low molecular weight aldehydes in smoke. Magnesium potassium phosphate is isostructural with magnesium ammonium phosphate and can form solid solutions therewith. Such solid solutions are also effective for reducing the aldehyde content in smoke, although the best embodiments of the invention minimize the potassium content of such solid solutions.

The ammonium-containing compound filler can also comprise one or more of the following mineral phases: dittmarite, struvite, hannayite, schertelite, mundrabillaite and swaknoite.

Ammonium-containing compounds considered useful as filler materials have a range of surface areas, a range of particle sizes (mostly in the micron range), possess appropriate opacity, have low solubility in water (required for papermaking), and possess other properties that are considered desirable in fillers for cigarette papers. For purposes of a filler for cigarette paper, the filler preferably has a particle size below 25 μm, more preferably below 10 μm.

When used as filler in the fabrication of wrappers for smoking articles, a preferred amount of the ammonium-containing compound filler is equal to about 10% to about 60% of the final wrapper weight, more preferably about 20% to about 50% by weight. This percentage is referred to as the filler loading. The ammonium-containing compound can be the sole filler or it can be mixed with one or more other fillers in the paper. In the case of mixtures, a portion, e.g., up to 60% by weight, of the filler loading can comprise one or more inorganic carbonate, inorganic hydroxide, inorganic oxide, or inorganic phosphate. Examples of such fillers include, e.g., calcium carbonate, magnesium hydroxide, magnesium oxide, magnesium carbonates, and titanium dioxide as well as other fillers known in the art.

The wrappers containing the fillers of the invention can have a basis weight of between about 15 to about 75 grams per square meter and can have a porosity of between about 2 to about 200 cubic centimeters per minute per square centimeter as measured by the CORESTA method ("CORESTA units"). The most preferred basis weight is between about 20 to about 50 grams per square meter and the most preferred porosity is between about 10 to about 110 CORESTA units.

Burn additives such as alkali metal salts of carboxylic acids or phosphoric acids can be applied to the wrapper to adjust or control the burn rate of the resulting smoking article. For example, burn additives can be applied in amounts ranging from about 2% to about 15% by weight of the wrapper. Examples of burn additives include sodium fumarate, sodium citrate, potassium citrate, potassium succinate, potassium monohydrogen phosphate, and potassium dihydrogen phosphate.

To prepare wrappers containing the fillers of the invention, conventional cigarette papermaking procedures are used with the inclusion of an ammonium-containing compound filler in accordance with the invention in place of or in combination with a conventional cigarette paper filler such as calcium carbonate. The paper wrappers may be made from flax, wood pulp, or other plant fibers. In addition, the paper wrappers may be a conventional one wrapper construction, a multiwrapped construction or a multilayer single wrap construction.

In order to demonstrate the practice and beneficial results of this invention several cigarette paper compositions were prepared with different fillers and varying total filler weight per square meter of paper. The total filler weight per square meter of paper is controlled by adjusting the filler loading and/or the basis weight (thickness) of the paper. Examples of both handmade papers and machine-made papers as well as handmade cigarettes and machine-made cigarettes are included. The cigarette construction used was that of a less traditional design shown in Figure 3 wherein the cigarette is useable with an electronic smoking device as described in U.S. Patent No. 5,692,525, the entire content of which is

hereby incorporated by reference. Formaldehyde and acetaldehyde levels in mainstream smoke of cigarettes prepared using the paper wrappers of this invention as the outer paper wrap (71) of the cigarette were analyzed using a whole smoke method and compared, using the same smoking conditions, to control cigarettes of the same construction using an outer paper wrap containing about 35% by weight calcium carbonate at a basis weight of 28 g/m^2 and a porosity of 46 CORESTA. Table 1 lists different cigarette samples with paper descriptions including filler, filler level, basis weight, porosity and the amount of ammonia available per square centimeter of paper, and the percent reduction in the content of formaldehyde and acetaldehyde in the mainstream smoke for each cigarette versus its control. As shown in Table 1, use of the ammonium-containing compound magnesium ammonium phosphate as the filler in the cigarette papers surprisingly and unexpectedly produced reduction in the content of formaldehyde in mainstream smoke of up to 91%.

TABLE 1

Cigarette Sample	Outerwrap Paper					% Reduction In Mainstream Smoke*	
	Filler	Filler %	Basis Wt. (g/m^2)	Porosity (CORESTA)	Ammonia (μmoles/ cm^2)	Formalde-hyde	Acetalde-hyde
1	$MgNH_4PO_4 \cdot 6H_2O$	40	25	25	4.1	91%	59%
2	25% $MgNH_4PO_4 \cdot 6H_2O$ 75% $CaCO_3$	40	25	25	1.0	no reduction	5%
3	50% $MgNH_4PO_4 \cdot 6H_2O$ 50% $CaCO_3$	40	25	24	2.0	48%	30%
4	75% $MgNH_4PO_4 \cdot 6H_2O$ 25% $CaCO_3$	40	25	24	3.1	64%	32%
5	$MgNH_4PO_4 \cdot 6H_2O$	40	25	20	4.1	91%	33%
6	$19MgNH_4PO_4 \cdot 5MgKPO_4 \cdot xH_2O$	30	35	27	3.7	81%	45%
7	$19MgNH_4PO_4 \cdot 5MgKPO_4 \cdot xH_2O$	40	25	27	3.5	89%	51%
8	$MgKPO_4 \cdot 6H_2O$	30	35	29	0.0	27%	43%
9	$MgHPO_4 \cdot 3H_2O$	40	25	31	0.0	42%	42%
10	$MgNH_4PO_4 \cdot xH_2O$	40	25	45	4.1	76%	46%
11	$MgNH_4PO_4 \cdot xH_2O$	30	35	27	4.3	72%	56%
12	$MgNH_4PO_4 \cdot xH_2O$	40	25	45	4.1	82%	41%
13	$19MgNH_4PO_4 \cdot 5MgKPO_4 \cdot xH_2O$	34	47	80	5.5	87%	61%
14	$Mg(NH_4)_{0.95}K_{0.05}PO_4 \cdot xH_2O$	30	37	55	4.5	85%	48%
15	$Mg(NH_4)_{0.95}K_{0.05}PO_4 \cdot xH_2O$	35	45	24	6.4	90%	57%
16	Albacar $CaCO_3$	30	37	29	0.0	no reduction	11%

* Values listed for each sample are the average of three cigarettes smoked with an electronic smoking device using comparable energies.

Figure 1 is a graph of formaldehyde and acetaldehyde reduction versus available ammonia (μmoles/cm^2 of paper) in magnesium ammonium phosphate containing cigarette papers in accordance with the invention. As shown in Figure 1, the percent reduction in the content of formaldehyde and acetaldehyde in mainstream smoke increases with an increase in available ammonia (generated from the heating of the magnesium ammonium phosphate paper filler) per unit area of paper. Surprisingly, with increasing levels of magnesium ammonium phosphate filler (available ammonia) the formaldehyde levels decrease at a faster rate than do the acetaldehyde levels. It is believed, based on thermogravimetric/mass spectroscopy data, that only ammonia and water are released from the magnesium ammonium phosphate filler during combustion/pyrolysis of the paper and that both chemistry and thermodynamics are responsible for reducing the aldehyde content in smoke. The released ammonia can affect the aldehyde content of the generated smoke by a number of mechanisms, which could operate either independently or simultaneously. While not wishing to be bound by theory, we believe that among possible mechanisms which may be responsible for reducing the aldehyde content is a chemical reaction between the ammonia and aldehyde gases, the reaction product(s) of which may be less volatile and condensed/trapped in the ashes, rod, and/or filter of the cigarette. Another possibility is that a change in the temperatures of combustion/pyrolysis and/or the presence of ammonia in the combustion/pyrolysis environment may ultimately affect the initial formation of the aldehydes produced during the smoking process.

A cigarette wrapper in accordance with the invention can have any desired configuration and/or one or more layers of fiber such as paper and/or tobacco incorporating a filler effective in reducing the content of aldehydes. For instance, the cigarette wrapper 2 can be a single layer 4 surrounding a tobacco rod 6, as shown in the partial sectional view of Figure 2. A less traditional cigarette wrapper is shown in Figure 3 wherein the cigarette is useable with an electronic smoking device as described in U.S. Patent No. 5,692,525. Figure 3 illustrates

one type of construction of a cigarette 100 which can be used with an electrical smoking device. As shown, the cigarette 100 includes a tobacco rod 60 and a filter portion 62 joined by tipping paper 64. The filter portion 62 preferably contains a tubular free-flow filter element 102 and a mouthpiece filter plug 104. The free-flow filter element 102 and mouthpiece filter plug 104 may be joined together as a combined plug 110 with plug wrap 112. The tobacco rod 60 can have various forms incorporating one or more of the following items: an overwrap 71, another tubular free-flow filter element 74, a cylindrical tobacco plug 80 preferably wrapped in a plug wrap 84, a tobacco web or mat 66 comprising a base web 68 and tobacco 70, and a void space 91. The free-flow filter element 74 provides structural definition and support at the tipped end 72 of the tobacco rod 60. At the free end 78 of the tobacco rod 60, the tobacco web 66 together with overwrap 71 are wrapped about cylindrical tobacco plug 80. The tobacco rod can comprise tobacco, tobacco blends, tobacco substitutes, etc. The filler in accordance with the invention can be incorporated in one or more of the layers 71, 84, 68, 70 or 66.

While the invention has been described with reference to preferred embodiments, it is to be understood that variations and modifications may be resorted to as will be apparent to those skilled in the art. Such variations and modifications are to be considered within the purview and scope of the invention as defined by the claims appended hereto.

WHAT IS CLAIMED IS:

1. A wrapper for a smoking article wherein tobacco is contained by the wrapper, the wrapper comprising a cellulosic web material and at least one filler therein, the filler being effective to reduce the content of gaseous components in the smoke produced upon combustion/pyrolysis of the smoking article.

2. The wrapper according to Claim 1, wherein the filler includes an ammonium-containing compound filler in an amount effective to reduce aldehyde content in the mainstream smoke produced upon combustion/pyrolysis of the smoking article.

3. The wrapper according to Claim 1, wherein the filler includes an inorganic compound selected from the group consisting of inorganic carbonates, inorganic hydroxides, inorganic oxides, and inorganic phosphates.

4. The wrapper according to Claim 2, wherein the ammonium-containing compound filler is magnesium ammonium phosphate or one of its hydrates.

5. The wrapper according to Claim 1, wherein the filler ranges from about 10% to about 60% by weight based on the total weight of the wrapper.

6. The wrapper according to Claim 1, wherein the wrapper comprises cigarette paper having a single layer or multilayers.

7. The wrapper according to Claim 1, having a basis weight of between about 15 g/m^2 to about 75 g/m^2, and a porosity of between about 2 CORESTA units to about 200 CORESTA units.

8. The wrapper according to Claim 1, having a basis weight of between about 20 g/m^2 to about 50 g/m^2, and a porosity of between about 10 CORESTA units to about 110 CORESTA units.

9. The wrapper according to Claim 1, wherein the wrapper includes from about 2% to about 15% by weight of a burn additive.

10. The wrapper according to Claim 9, wherein the burn additive is an alkali metal salt of an acid.

11. The wrapper according to Claim 10, wherein the alkali metal salt of an acid is at least one member selected from the group consisting of sodium fumarate, sodium citrate, potassium citrate, potassium succinate, potassium monohydrogen phosphate, and potassium dihydrogen phosphate.

12. The wrapper according to Claim 2, wherein the ammonium-containing compound filler is an inorganic ammonium metal salt.

13. The wrapper according to Claim 2, wherein the amount of the ammonium-containing compound ranges from about 20% to about 50% by weight based on the total weight of the wrapper.

14. The wrapper according to Claim 1, wherein the wrapper comprises cigarette paper and the cellulosic material comprises plant fibers.

15. The wrapper according to Claim 2, wherein the ammonium-containing compound filler is a solid solution of magnesium ammonium phosphate and magnesium potassium phosphate or any of their respective hydrates.

16. The wrapper according to Claim 2, wherein the ammonium-containing compound filler comprises at least one of the mineral phases dittmarite, struvite, hannayite, schertelite, mundrabillaite and swaknoite.

17. The wrapper according to Claim 2, wherein the ammonium-containing compound filler includes at least two different ammonium-containing compounds.

18. The wrapper according to Claim 1, wherein the wrapper comprises cigarette paper surrounding a rod of cigarette tobacco.

19. The wrapper according to Claim 1, wherein the gaseous component whose content is reduced by the presence of the filler during combustion/pyrolysis of the smoking article includes at least one low molecular weight aldehyde.

20. The wrapper according to Claim 1, wherein the wrapper is perforated and/or includes a film forming agent.

21. A cigarette comprising a tobacco rod contained by a paper wrapper and an optional filter at one end of the cigarette, the paper wrapper comprising a cellulosic web material and at least one filler therein, the filler being effective to reduce the content of gaseous components in the smoke produced by combustion/pyrolysis of the cigarette.

22. The cigarette according to Claim 21, wherein the filler includes an ammonium-containing compound filler in an amount effective to reduce aldehyde content in the mainstream smoke produced upon combustion/pyrolysis of the cigarette.

23. The cigarette according to Claim 22, wherein the ammonium-containing compound filler consists essentially of magnesium ammonium phosphate and/or calcium ammonium phosphate.

24. A cigarette comprising a tobacco web surrounding a tobacco rod, a paper wrapper surrounding the tobacco web, and an optional filter at one end of the cigarette, the paper wrapper comprising a cellulosic web material and at least one filler therein, the filler being effective to reduce the content of gaseous components in mainstream smoke produced by combustion/pyrolysis of the cigarette.

25. The cigarette according to Claim 24, wherein the filler includes an ammonium-containing compound filler in an amount effective to reduce aldehyde content in the mainstream smoke produced upon combustion/pyrolysis of the cigarette.

26. A web comprising a cellulosic web material and a filler, at least a portion of said filler consisting essentially of magnesium ammonium phosphate and/or calcium ammonium phosphate.

27. A cigarette comprising a tobacco web surrounding a tobacco rod, a paper wrapper surrounding the tobacco web, and an optional filter at one end of the cigarette, the tobacco web comprising tobacco and at least one filler therein,

the filler being effective to reduce the content of gaseous components in mainstream smoke produced by combustion/pyrolysis of the cigarette.

ABSTRACT

The invention relates to a tobacco smoking article wrapper which selectively reduces the content of gaseous components in the smoke delivered during the use of the smoking article. The gaseous components can be low molecular weight aldehydes in the smoke produced during combustion/pyrolysis of the smoking article. The wrapper can comprise cigarette paper having an ammonium-containing compound filler therein for reducing the aldehyde content in the smoke. The ammonium-containing compound filler evolves ammonia upon combustion/pyrolysis of the smoking article which can chemically react with aldehydes in tobacco smoke and/or modify the combustion/pyrolysis reactions thereby reducing the initial formation of aldehydes to selectively reduce such aldehydes from the smoke inhaled by a smoker. The ammonium-containing compound can be magnesium ammonium phosphate used alone or in combination with one or more other fillers such as calcium carbonate.

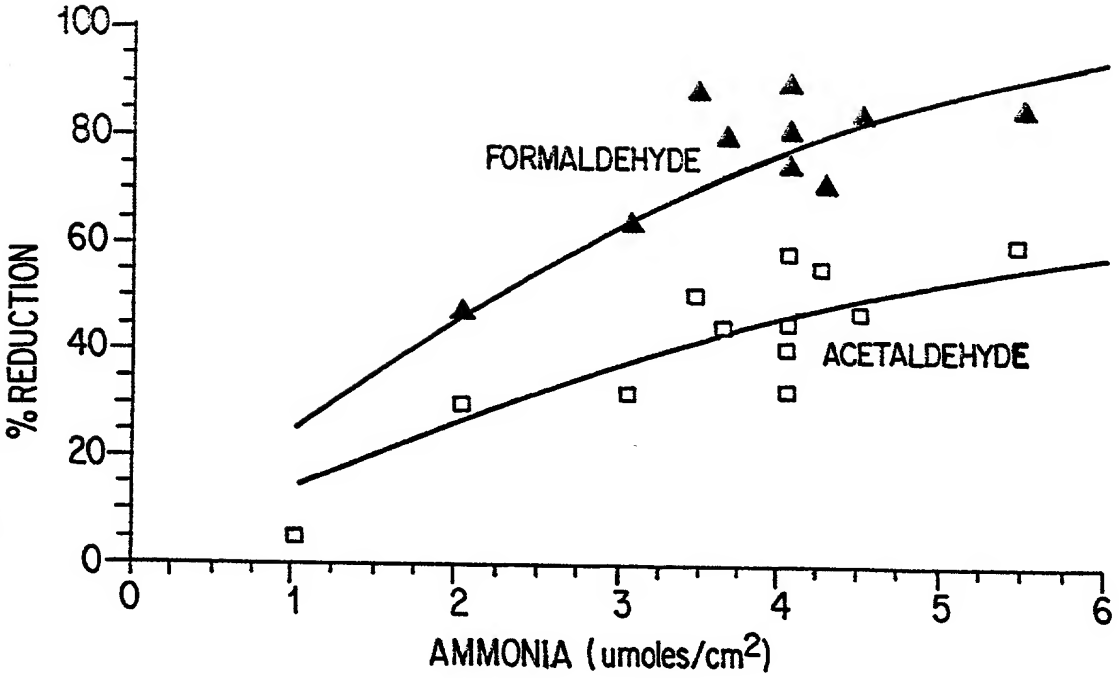
100
80
60
40
20
0
% REDUCTION
FORMALDEHYDE
ACETALDEHYDE
0
1
2
3
4
5
6
AMMONIA (umoles/cm2)

FIG. 1

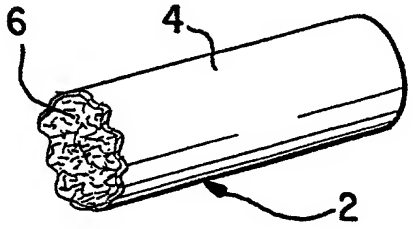
6
4
2

FIG. 2

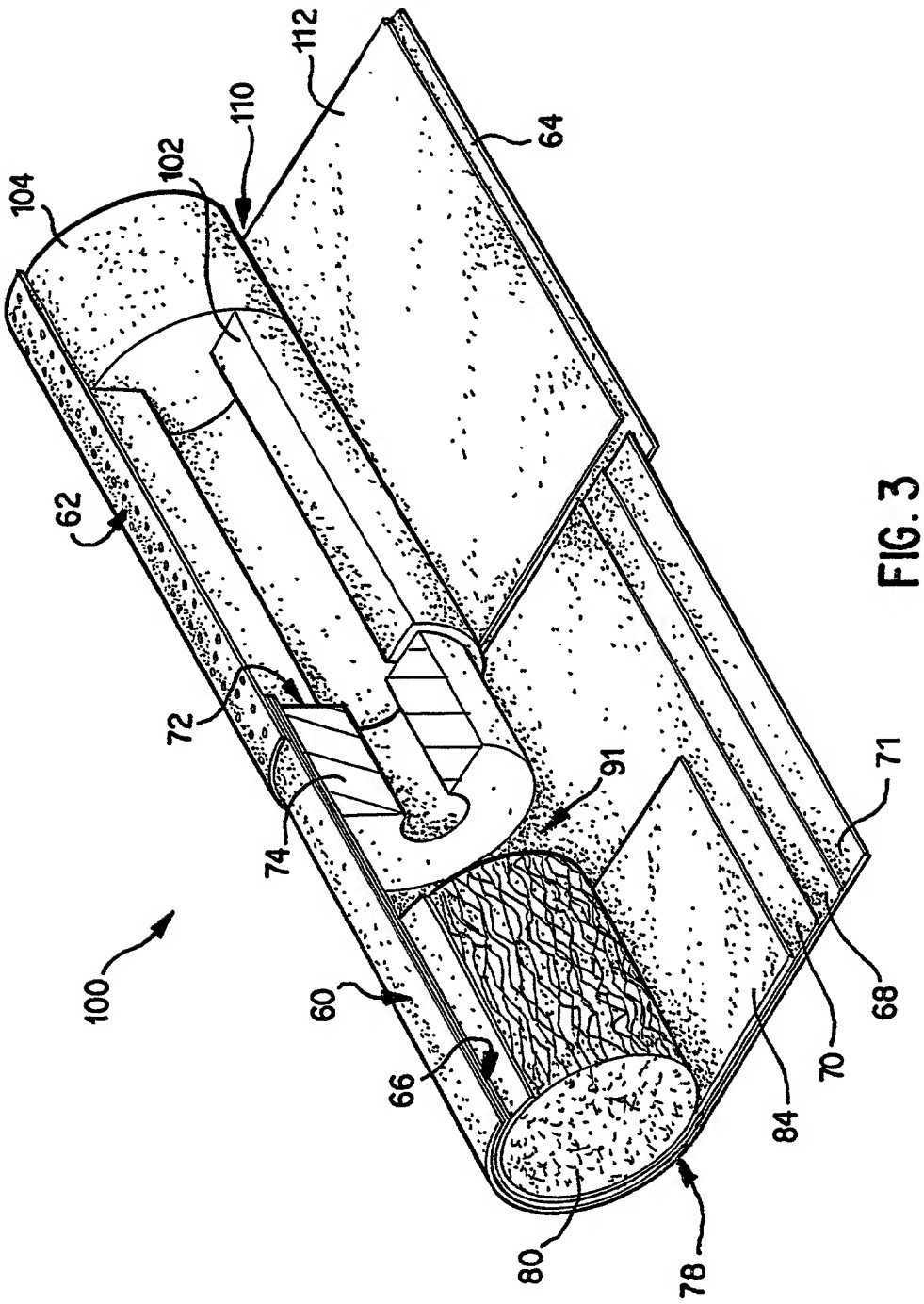

FIG. 3

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY **(Includes Reference to Provisional and PCT International Applications)**	Attorney's Docket No. 021238-503

As a below named inventor, I hereby declare that:
My residence, post office address and citizenship are as stated below next to my name;
I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

SMOKING ARTICLE WRAPPER WITH IMPROVED FILLER

the specification of which (check only one item below):

☐ is attached hereto.

☒ was filed as United States application
Number _____
on January 24, 2002
and was amended
on _____ (if applicable).

☐ was filed as PCT international application
Number _____
on _____
and was amended
on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 (a)-(e) of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

PRIOR FOREIGN/PCT APPLICATION(S) AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. §119:

COUNTRY (if PCT, indicate "PCT")	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 35 U.S.C. §119
			_Yes _No
			_Yes _No
			_Yes _No
			_Yes _No
			_Yes _No

I hereby claim the benefit under Title 35, United States Code § 119(e) of any United States provisional application(s) listed below.

_____ _____
(Application Number) (Filing Date)

_____ _____
(Application Number) (Filing Date)

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY (CONT'D) (Includes Reference to Provisional and PCT International Applications)	Attorney's Docket No. 021238-503

I hereby claim the benefit under Title 35, United States Code, §120 of any United States applications(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose to the Office all information known to me to be material to the patentability as defined in Title 37, Code of Federal Regulations §1.56, which became available between the filing date of the prior application(s) and the national or PCT international filing date of this application:

PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S. FOR BENEFIT UNDER 35 U.S.C. §120:

U.S. APPLICATIONS		STATUS *(check one)*		
U.S. APPLICATION NUMBER	U.S. FILING DATE	PATENTED	PENDING	ABANDONED
09/361,988	July 28, 1999			X
09/399,159	September 20, 1999	X		

PCT APPLICATIONS DESIGNATING THE U.S.					
PCT APPLICATION NO.	PCT FILING DATE	U.S. APPLICATION NUMBERS ASSIGNED (if any)			
PCT/US00/19929	July 21, 2000			X	

I hereby appoint the following attorneys and agent(s) to prosecute said application and to transact all business in the Patent and Trademark Office connected therewith and to file, prosecute and to transact all business in connection with international applications directed to said invention:

William L. Mathis	17,337	Eric H. Weisblatt	30,505	Bruce T. Wieder	33,815
Robert S. Swecker	19,885	James W. Peterson	26,057	Todd R. Walters	34,040
Platon N. Mandros	22,124	Teresa Stanek Rea	30,427	Ronni S. Jillions	31,979
Benton S. Duffett, Jr.	22,030	Robert E. Krebs	25,885	Harold R. Brown III	36,341
Norman H. Stepno	22,716	William C. Rowland	30,888	Allen R. Baum	36,086
Ronald L. Grudziecki	24,970	T. Gene Dillahunty	25,423	Brian P. O'Shaughnessy	32,747
Frederick G. Michaud, Jr.	26,003	Patrick C. Keane	32,858	Kenneth B. Leffler	36,075
Alan E. Kopecki	25,813	B. Jefferson Boggs, Jr.	32,344	Fred W. Hathaway	32,236
Regis E. Slutter	26,999	William H. Benz	25,952	Wendi L. Weinstein	34,456
Samuel C. Miller, III	27,360	Peter K. Skiff	31,917	Mary Ann Dillahunty	34,576
Robert G. Mukai	28,531	Richard J. McGrath	29,195		
George A. Hovanec, Jr.	28,223	Matthew L. Schneider	32,814		
James A. LaBarre	28,632	Michael G. Savage	32,596		
E. Joseph Gess	28,510	Gerald F. Swiss	30,113		
R. Danny Huntington	27,903	Charles F. Wieland III	33,096		

and: Kevin B. Osborne, Reg. No. 33,750; Clinton H. Hallman, Reg. No. 38,480; Charles E. B. Glenn, Reg. No. 29,796

Address all correspondence to:

Peter K. Skiff
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P.O. Box 1404
Alexandria, Virginia 22313-1404

Address all telephone calls to: Peter K. Skiff at (703) 836-6620.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY (CONT'D) (Includes Reference to Provisional and PCT International Applications)	Attorney's Docket No. 021238-503

FULL NAME OF SOLE OR FIRST INVENTOR Jay A Fournier	SIGNATURE	DATE
RESIDENCE Richmond, Virginia	CITIZENSHIP U.S.A.	
POST OFFICE ADDRESS 11771 Wexwood Drive, Richmond, Virginia 23236		
FULL NAME OF SECOND JOINT INVENTOR, IF ANY John B. Paine, III	SIGNATURE	DATE
RESIDENCE Midlothian, Virginia	CITIZENSHIP U.S.A.	
POST OFFICE ADDRESS 13630 Trilithon Road, Midlothian, Virginia 23113		

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY (Includes Reference to Provisional and PCT International Applications)	Attorney's Docket No. 021238-503 - PM1878II

As a below named inventor, I hereby declare that:
My residence, post office address and citizenship are as stated below next to my name;
I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

SMOKING ARTICLE WRAPPER WITH IMPROVED FILLER

the specification of which (check only one item below):

☐ is attached hereto.

☐ was filed as United States application
Number _____
on _____
and was amended
on _____ (if applicable).

☒ was filed as PCT international application
Number PCT/US00/19929
on July 21, 2000
and was amended
on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

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PRIOR FOREIGN/PCT APPLICATION(S) AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. §119:

COUNTRY (if PCT, indicate "PCT")	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 35 U.S.C. §119
			_Yes _No
			_Yes _No
			_Yes _No
			_Yes _No
			_Yes _No

I hereby claim the benefit under Title 35, United States Code § 119(e) of any United States provisional application(s) listed below.

_____ _____
(Application Number) (Filing Date)

_____ _____
(Application Number) (Filing Date)

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY (CONT'D) (Includes Reference to Provisional and PCT International Applications)	Attorney's Docket No. 021238-503 - PM1878II

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PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S. FOR BENEFIT UNDER 35 U.S.C. §120:

U.S. APPLICATIONS		STATUS *(check one)*		
U.S. APPLICATION NUMBER	U.S. FILING DATE	PATENTED	PENDING	ABANDONED
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Benton S. Duffett, Jr.	22,030	Robert E. Krebs	25,885	Harold R. Brown III	36,341
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Alan E. Kopecki	25,813	B. Jefferson Boggs, Jr.	32,344	Fred W. Hathaway	32,236
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James A. LaBarre	28,632	Michael G. Savage	32,596		
E. Joseph Gess	28,510	Gerald F. Swiss	30,113		
R. Danny Huntington	27,903	Charles F. Wieland III	33,096		

21839

and: Kevin B. Osborne, Reg. No. 33,750; Clinton H. Hallman, Reg. No. 38,480; Charles E. B. Glenn, Reg. No. 29,796

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COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY (CONT'D) (Includes Reference to Provisional and PCT International Applications)	Attorney's Docket No. 021238-503 - PM1878II

FULL NAME OF SOLE OR FIRST INVENTOR Jay A Fournier	SIGNATURE	DATE 5/8/02
RESIDENCE Richmond, Virginia VA	CITIZENSHIP U.S.A.	
POST OFFICE ADDRESS 11771 Wexwood Drive, Richmond, Virginia 23236		
FULL NAME OF SECOND JOINT INVENTOR, IF ANY John B. Paine, III	SIGNATURE John B Paine, III	DATE May 9, 2002
RESIDENCE Midlothian, Virginia VA	CITIZENSHIP U.S.A.	
POST OFFICE ADDRESS 13630 Trilithon Road, Midlothian, Virginia 23113		